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spectrum of the nebulae, can hardly be accepted as fair to that eminent investigator and pioneer in that line.

An interesting account is given of the appearances of the temporary stars, or '*Novæ*,' with their spectroscopic history, in which the observations of the author properly take a prominent place. Chapter XIV. is entitled '*How the hypothesis has fared*,' referring more particularly to the bearing of the recent work on *Nova Aurigæ* upon the meteoritic hypothesis. The last quarter of the work discusses the problem of stellar classification. The principal contention of the author is that a spectral classification should provide both for stars that may be growing hotter as well as for those that may be growing cooler. The implication is that the adoption of this principle requires the acceptance of the meteoritic hypothesis, an implication recurring in other parts of this work. The necessity is, however, by no means obvious.

In the diagrams to show the difference in the spectra of stars considered by the author to be of increasing, and those of decreasing temperature, it would seem quite possible to exchange the labels under the cuts without seriously affecting the plausibility of the reasoning.

With that part of the final conclusion, already quoted, that locates the sun in close spectral proximity with Arcturus and Capella, no doubt all astronomers will agree.

The process illustrations of the book are not in keeping with its otherwise admirable typographical appearance, and are distinctly inferior to the excellent engravings in the earlier '*Meteoritic Hypothesis*.'

EDWIN B. FROST.

Astronomy. By AGNES M. CLERKE; A. FOWLER, A.R.C.S., F.R.A.S.; J. ELLARD GORE, F.R.A.S., M.R.I.A. New York, D. Appleton & Co.

It is of supreme importance to a science that the popular writing representing it before the world of culture should be alike a graceful and an accurate exponent of the special subject. Astronomy seems in many instances to have been not too fortunate in the character of the literature promulgated as '*popular astronomy*.' The unfortunate experience of this science leads

one then the more nervously to examine the credentials of a new recruit, and the more gratefully to welcome into popular astronomical literature a book of the honorable purpose and generally praiseworthy execution of the present volume.

'Astronomy' is divided into four chapters. In the first Miss Clerke submits a concise résumé of the history of astronomy; then follows a chapter on spherical, practical and gravitational astronomy expounded according to simple geometrical considerations by Professor Fowler; the third, also by Miss Clerke, reviews concisely our present knowledge of the solar system; the fourth and last is a concise treatise on the sidereal heavens by Professor Gore.

The prime question naturally suggested by the tripartite authorship is whether a triple responsibility is really necessary in connection with a book whose aim is for the most part popular. A superficial examination would also incline one at once to challenge so ambitious a combination of authors in a book of but 565 pages. Closer examination, however, seems fully to justify the threefold authorship. As a volume of '*The Concise Knowledge Library*' it evidently aims both at great conciseness, scientific accuracy and freshness; and hence with the vast domain of astronomical science to be condensed into a moderate-sized volume it was clearly an advantage to have the work thus apportioned among several writers, each facile in the descriptive art and each faithful to the cause of scientific astronomy.

Considering the scope of the facts to be presented and the plan adopted, it would be beyond expectation to find a performance of this sort altogether blameless. Attempt at the required conciseness, coupled with an assignment of special subjects to each author under strict limitations, has seemed to exercise too restraining an influence. Subjects like modern astronomical spectroscopy and celestial photography have, taking the book as a whole, scarcely infused their full inspiration. The extreme brevity of the reference to far-reaching topics like '*tidal evolution*' is almost tantalizing. Perhaps the character whose absence one misses most is direct discussion of astronomical methods and results from the standpoint of the active ob-

server. The flavor, while sufficiently literary, lacks a certain essence to be caught up only from the activities of the observatory.

And yet it was expected that a volume counting Miss Clerke, the graceful, accurate and forceful author of 'A Popular History of Astronomy during the Nineteenth Century,' among its sponsors would not be lacking in vital interest. Her contributions to 'Astronomy' have not fallen below her former high standard, except in very few particulars. Especially noteworthy and able are the pages on the history of the achievements of gravitational astronomy of the period immediately succeeding Newton. But by the time the modern stage of spectroscopic astronomy is reached one feels a lack of the former easy swing of her pen, and one also regrets to notice a trace of that peculiar English tendency to ignore foreign scientific achievement. How the judicious pen of Miss Clerke could refrain from setting in artistic relief the grand achievements of a Kirchoff, while it does enthusiastic and just homage to a Huggins, is inexplicable except on grounds of excessive brevity. Truth to say, Miss Clerke has always seemed to repudiate insularity in all of her astronomical writings, and one would not tax her here with anything more than an unconscious bias, in certain particulars, toward her own countrymen, nor indeed generally with anything less than a most fascinating and powerful presentation of the thrilling discoveries and stupendous facts of astronomical science.

Professor Gore's review of the science of the stellar universe gives ample evidence of a determination to bring before the cultured public science fresh from its primal sources. Nearly every page bears evidence of faithful appreciation of the original contributions of astronomers and of a consistent assimilation of the vast mass of material. Although lacking somewhat in that vivacity of style characteristic of Miss Clerke, one is impressed with the conscientious fervour and decisive grasp of Professor Gore's presentation of subjects bristling with numberless suggestive facts and insuperable difficulties.

For Professor Fowler, the accomplished practical astronomer, so favorably known by his

successful observational work, was reserved the more or less thankless task of furnishing the more mathematical side of the book. Ever since Laplace, under an unlucky star, rashly attempted to put mathematics into words, in the celebrated *Système du Monde*, we have become convinced of the necessary inadequateness of ordinary language, and even of ordinary geometry, to the expression of this class of ideas. We cannot, therefore, harshly set forth the weak points which necessarily inhere in an attempt to compress all the marvels of mathematical astronomy into less than two hundred pages of a popular account. Rather would we express the genuine surprise which one experiences in following the author's ingenuity in presenting the difficult geometrical and dynamical conceptions of the astronomer. Most interesting is the complete and accurate though condensed review of the instrumental appliances characteristic of modern astronomy.

It would be a graceless act to close this brief review of a valuable addition to the popular side of astronomy without at once complimenting the American publishers on the fair typography, and condoling with them on the binding of a book of this character in a style bereft of every element of propriety and good taste.

M. B. SNYDER.

Lehrbuch der Entwicklungsgeschichte des Menschen. Von PROFESSOR J. KOLLMANN. Jena, Fischer. 1898. 8vo. Pp. xii + 658.

Embryological literature has been again enriched by a valuable text-book by Professor Kollmann (Basel, Switzerland). As the title indicates, the work deals preeminently with human embryology, comparative-embryological facts being adduced only in so far as desirable for a better understanding of corresponding processes in man. The book is furnished with a considerable number of good illustrations, of which a great many are original and entirely new. Preference is given to illustrations taken from 'plastic reconstructions' and so-called 'combined drawings.' Such illustrations are, of course, especially valuable for demonstrating complicated morphological structures which in the single sections of a series are only shown in fragments. It needs, however, to be